

Common lung infection in infants has different subtypes with differing asthma risks

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Bronchiolitis—the most common lung infection in young children, and which is most often caused by respiratory syncytial virus, or RSV—is

the leading cause of hospitalizations in U.S. infants, and about 30% of those with severe bronchiolitis later develop asthma. A team led by investigators at Massachusetts General Hospital (MGH) has uncovered four distinct molecular subtypes of RSV bronchiolitis and has linked a certain subtype to a higher asthma risk. The findings are published in *Nature Communications*.

"While [bronchiolitis](#) has been considered a single disease with similar mechanisms, emerging evidence has suggested that bronchiolitis consists of multiple disease subgroups," says lead author Yoshihiko Raita, MD, MMSc, a researcher in the MGH Department of Emergency Medicine. "But our limited understanding of RSV bronchiolitis, and how it varies, has held up efforts to develop RSV bronchiolitis treatment and asthma prevention strategies."

To provide insights, Raita and his colleagues analyzed diverse clinical, genetic and [molecular data](#) from 221 infants hospitalized with RSV bronchiolitis who were followed until five years of age. The scientists gathered information on the viruses that had infected the children, as well as information on the microbes, metabolites and immune response-related molecules present in the children's nasal passages.

Based on their analyses, four biologically and clinically meaningful subtypes, or endotypes, of RSV bronchiolitis exist. Of these, one endotype—which is characterized by coinfection by rhinovirus, dominance by specific bacteria, and high interferon (antiviral) response—had an approximate 40% risk of developing asthma by age five.

"Our data add significant support to the emerging concept that bronchiolitis represents several diseases with unique biological mechanisms," says Raita. "For clinicians, our findings give an [evidence base](#) for the early identification of high-risk children during an

important period of airway development: Early infancy. For researchers, our data offer new avenues for the development of subgroup-specific strategies—such as fine-tuning the airway immune response and microbiome—for treating bronchiolitis and preventing [asthma](#)."

More information: Yoshihiko Raita et al, Integrated omics endotyping of infants with respiratory syncytial virus bronchiolitis and risk of childhood asthma, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-23859-6](#)

Provided by Massachusetts General Hospital

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